would give some support to Murray's theory of bipolarity had not the evidence against it by the rest of the Antarctic fauna been overwhelming. He also furnishes further evidence that some arenaceous foraminifera select the material for their shells, since *Reophax spiculifera* rejects sand grains and uses only sponge spicules, which it builds up into funnel-shaped chambers. Mr. Chapman's most interesting Antarctic fossil is a Cambrian calcareous alga, which he has referred to Bornemann's genus Epiphyton from Sardinia as a new species, *E. fasciculatum.*

The rest of the volume consists of a series of petrologic reports by Messrs. Jensen, Allan Thomson, Benson, Walkom, Woolnough, Skeats, and Cotton, Sir Douglas Mawson, and Miss Cohen. Dr. Jensen describes some samples of Antarctic soil on which, though due to mechanical disintegration rather than to chemical decay, plants were found to grow when kept adequately warm. Dr. Jensen also contributes a chapter on the interesting alkaline rocks of Mount Erebus, and discusses the classification of the kenytes and their relations to the trachydolerites. Dr. Allan Thomson has carefully investigated some inclusions in the trachytes and kenytes, and founded for one series a new rock type, *microtinite,* so called as they are aggregates of plagioclase felspars. He discusses the terminology of included rock fragments, and adopts Lacroix's terms "homœogenous" and "enallogenous" as the best yet proposed.

The volume has an excellent index to both volumes. Mr. Dun's promised bibliography of Antarctic geology has been postponed, but its early publication would be a great boon, as the subject has now a very scattered literature.

RADIO-MECHANICS.

Radio-dynamics: The Wireless Control of Torpedoes and Other Mechanisms. By B. F. Miessner. Pp. v+206. (London: Crosby Lockwood and Son, 1917.) Price 9*s.* net.

THIS little volume deals with a subject of considerable interest at the present time, viz. the control of torpedoes or other vessels of war by means of electromagnetic waves. The author has, however, unnecessarily increased the bulk of his book by the introduction of a good deal of irrelevant matter, and by space given to elementary facts connected with wireless telegraphy which might quite well have been taken as familiar to any reader likely to be interested in it. Moreover, he has rather overestimated the importance of the early work of some American investigators, such as Dolbear and Tesla, and done insufficient justice to that of European workers, such as Marconi, Fleming, Lodge, Muirhead, E. Wilson, and others. Too much space is given to the description of methods of communication, such as those of earth conduction, ultra-violet light, and infra-red rays, which have never become practically useful.

The proper discussion of apparatus for the control of mechanism at a distance by means of electromagnetic waves does not begin until chap. xi., p. 78, of the book, and even then the treatment is of a rather sketchy character. The essential principles involved are quite easy to understand. A torpedo or other vessel to be directed must have on it some source of motive power such as storage cells, compressed air, or a petrol motor. This power drives the screw propeller and moves the vessel. Also the same source of power is used to put the helm to port or starboard or straight. We have then to set in motion some motor or gearing which starts or stops the driving power, or engages or changes the mechanism for steering. The boat is, therefore, provided with a mast carrying an aerial wire or antenna, by means of which electromagnetic waves sent out from a shore station are absorbed. The feeble electric currents thus set up in the aerial wire are utilised to set in motion a sensitive relay, and this in turn has to control the power which steers or propels the boat.

The first difficulty is the nature of the radiation detector which is connected to the antenna. In the early days of wireless telegraphy this was always some form of coherer, generally the metallic-filings coherer of Branly as modified by Marconi or Lodge. This detector is, however, rather uncertain in action and requires the addition of an automatic tapper to bring it back to the sensitive state after it has received and responded to a signal. Hence of late years it has been entirely ousted as a wave detector by more certain appliances, such as Marconi's magnetic detector, the Fleming vacuum valve, or some form of crystal detector. These modern detectors operate with or control such small alternating currents that they cannot with certainty set in action any electromagnetic relay capable of being used on board a small vessel at sea.

The first difficulty, therefore, in connection with the mechanism of radio-directed vessels is the selection of a suitable wave detector and of a relay. The author found that a form of Lodge-Muirhead self-acting coherer, called the steel-wheel coherer, was a useful one, and he constructed a suitable relay by modifying a type of movable-coil galvanometer. Even when such arrangements are perfected so that the sending out of electromagnetic waves which impinge on the torpedo aerial can be made to steer it by setting in action some mechanism which throws over the rudder to one side or the other, there still remains the difficulty of rendering the radio-receiver immune to vagrant electric waves or to intentional attempts to mis-steer the boat on the part of an enemy.

The reader will find in chap. xiv. an account of the work done in attempts to develop a radio-steered torpedo at the laboratory of Mr. John Hays Hammond, jun. In chaps. xv. and xvi. the difficulties connected with control and interference are discussed.

Although small vessels have been controlled in this manner by electromagnetic waves up to a distance of ten miles or rather more, the practical problem of certain control cannot be said to have been solved. The present book deals, therefore,

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with an experimental stage of the subject, which may, however, have considerable possibilities of actual utility in warfare.

In any future edition of his book the author would be well advised to cut out all unessential matter. He is not a safe guide on points of history or priority in relation to radio-telegraphic invention. His statement on p. 32 as to "later improvements" is absurdly inaccurate. On pp. 105 and 106 he misspells the name of Prof. E. Branly, the inventor of the metallic-filings coherer. On p. 173 he gives exclusive credit for the vacuum valve detector to Lee de Forest, apparently in entire ignorance that the Court of Appeals in the United States has confirmed Judge Mayer's decision that the de Forest audion is an infringement of the Fleming oscillation valve. He is also seemingly unaware that the so-called Dolbear system of wireless telegraphy was never operative. In spite of the fact that there is a free use of photographs of apparatus which are insufficiently described in the text, the reader who is desirous of learning what can be done in the radio-control of torpedoes will find a good deal of suggestive research described in this little book. J. A. F.

THE ACTION OF ENZYMES.

The Method of Enzyme Action. By Dr. J. Beatty. With Introduction by Prof. E. H. Starling. Pp. ix+143. (London: J. and A. Churchill, 1917.) Price 5*s.*

TWO-THIRDS of this book is devoted to an excellently clear and concise account of the facts and theories to be found in the books named in the preface, so far as they are connected with the action of enzymes. What is new, and the chief object of the book, is the suggestion of a hypothesis of enzyme action. The details can be adequately grasped only from the full description. It is based on two assumptions: (1) the possibility of "combination" between molecules, and (2) the loosening of internal bonds in one or both of the combining molecules as a result of this union. It is held that the action of all enzymes can be reduced to the combination with H and OH radicles derived from water. These radicles are "activated" by the power possessed by an enzyme of "attracting" one or the other. This is a general or unspecific property, but each enzyme has also a specific power of adsorbing some particular substrate. The author will, no doubt, admit that considerable further explanation is required as to the means by which the activation is effected, and criticism is difficult until more is known of the nature of the atom itself and of the way in which it is united to other atoms.

The hypothesis deserves to be kept in mind as more knowledge is gained of the action and the nature of enzymes. At present it is not easy to imagine ways of putting it to experimental test. Indeed, it must not be forgotten that the fundamental assumptions are not universally accepted. The present writer is inclined to think that the use of the word "combination," although very common, in speaking of the union between molecules and even of adsorption, is apt to lead to an obscuring of the great, salient facts of true chemical union. There are, as it seems, various stages of "combination," leading from adsorption, through molecular compounds, to cases where the change of properties is of the most striking kind.

It is somewhat unfortunate that the new hypothesis appears to involve the explanation of all catalytic action by the formation of intermediate compounds. This has been shown actually to take place in one case alone of heterogeneous catalysis, and since the compounds are only supposed to exist momentarily, it seems somewhat hopeless to expect a proof or disproof of their existence. The possibility of representing a reaction by a chemical equation does not necessarily show that it takes place in that way. The division of catalysts into inorganic and enzymes would be better replaced by that into homogeneous and heterogeneous, the latter to include enzymes. There are more differences between catalysis in homogeneous and heterogeneous systems than between inorganic heterogeneous catalysts and enzymes. In fact, more knowledge of the mechanism of heterogeneous catalysis is greatly to be desired. In future developments of his hypothesis the author might also find it of advantage to consider it more fully in the light of the doctrines of energetics.

W. M. B.

OUR BOOKSHELF.

Clinical Bacteriology and Haematology for Practitioners. By Dr. W. D'Este Emery. Fifth edition. Pp. xiii+plates xi+pp. 310. (London: H. K. Lewis and Co., Ltd., 1917.) Price 9*s.* net.

A NEW edition of Emery's "Clinical Bacteriology and Hæmatology" is always welcome, for it is a most useful book for the practitioner and for laboratory work. The general plan has been maintained in this fifth edition, but the text has been revised, some new matter added, and some more illustrations have been inserted.

In the section dealing with syphilis the McIntosh and Fildes method of performing the Wassermann reaction has been inserted in addition to the author's own method, and we think the author has been well advised to do this.

The Dreyer method of performing the agglutination test for typhoid fever is also described in full as well as earlier methods.

Cerebrospinal fever and the recognition of the meningococcus are dealt with more fully than previously, and the examination of carriers is described. Even now this section is none too long, and might be extended with advantage. We doubt if it is wise ever to rely on ordinary agar as a culture medium for this organism, as is suggested.

Malaria is described very briefly, and no mention is made that the crescents of sub-tertian fever are free in the blood-plasma and are not

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